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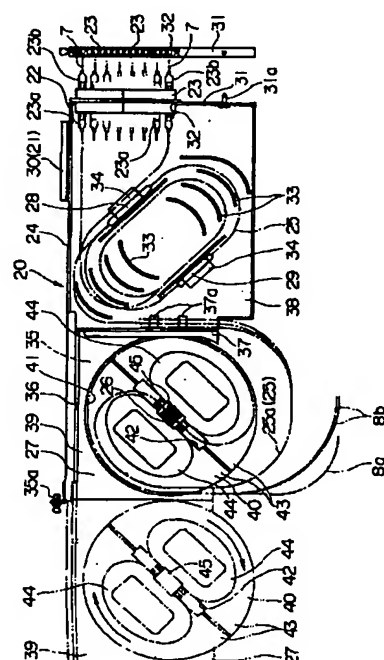
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(54) 【発明の名称】 光分岐モジュール

(57) 【要約】

【課題】 設置や取り出し作業に鑑みて実装密度の向上が困難であった。活線状態において光通信に影響を与えることなく接続切り替え等の作業を行うことが困難であった。

【解決手段】 一端部22に分岐接続用光コネクタ23を支持し、内部に途中に光カプラ28が介在された光ファイバテープ25を複数本収納する薄板状の本体24と、光ファイバテープ8a、8bと光ファイバテープ25とを切り替え可能に接続するMTコネクタ26およびその接続余長25aを収納し、本体24の前記分岐接続用光コネクタ23と対向する端部において出没自在に設けられ、本体24から離間した際に接続余長25aが引出余長として引き出される可動余長収納部27とを備えている。



**【特許請求の範囲】**

【請求項1】 多心の光ファイバ(8a、8b)を光コネクタ接続により光ファイバ心線(7)へ分岐接続するための光分岐モジュール(20)であって、分岐接続用光コネクタ(23)を一端部(22)に支持し、途中に光カプラ(28)が介在された光ファイバ(25)を内部に収納する本体(24)と、光ファイバ同士を切り替え可能に接続する切替用コネクタ(26)およびその接続余長(25a)を収納し、本体の前記分岐接続用光コネクタと対向する端部において出没自在に設けられ、本体から離間した際に接続余長が引出余長として引き出される可動余長収納部(27)とを備えることを特徴とする光分岐モジュール。

**【発明の詳細な説明】****【0001】**

【発明の属する技術分野】本発明は、通信用の光心線に試験光を挿入するための光分岐モジュールに関するものである。

**【0002】**

【従来の技術】光ファイバネットワークにおいて、例えば、光ケーブルを光コネクタ接続により光ファイバ心線へ分岐接続するには、多数の局内外光ファイバを成端して大群構成とする光配線架が使用される。特に加入者系伝送路に用いられる光配線架としては、FTM(Fiber Termination Module)が用いられる。図3および図4は、FTMに適用された従来の光配線架を示す図であり、図中、符号1はフレーム、2は端子板、3は光コネクタ、4は光分岐モジュールである。

【0003】前記フレーム1は、水平に配置された仕切板5によって等間隔の複数段に仕切られた棚状に形成されており、前記光分岐モジュール4を収納する段が複数段形成されている。このフレーム1の各段の同一側開口部には、該開口部を略覆う端子板2が固定されている。この端子板2には前記光コネクタ3の取り付け用の穴6が複数並べて連設され、この穴6内に周知のSC形の光コネクタ3が2個づつ配置・固定されている。この光コネクタ3は、外側に局内光ファイバ心線7が接続される図示しないSC形端子が複数配置され、内側に局外光ファイバ心線が接続される図示しない複数のSC形端子が前記局内光ファイバ心線7用の端子に対応する位置に配置されている。

【0004】以下、光分岐モジュール4の基本構成を図7に示す。図7に示すように、光分岐モジュール4内には、光カプラ9、光フィルタ4d、および光ファイバ4cを切り替え接続するための光コネクタ10等の光部品が収納される。光線路の試験・管理を行うには、まず、試験対象となる心線を収納する光分岐モジュールを心線選択装置4aにて選択し、光パルス試験装置4bから送出された試験光(光パルス)を、光カプラ9を経由して

測定対象となる局外側の光ファイバ4cへ送出し、さらに、当該光ファイバ4cで発生する後方散乱光を光カプラ9を経由して光パルス試験装置4bの受光部で受光し、次いで、受光された後方散乱光の波形を解析することにより光線路の損失異常をモニタする。

【0005】図5、図6に沿って、従来の4心用分岐モジュールについて説明すれば、この光分岐モジュールは、全体として薄板状のパッケージであり、図示しない開閉蓋により開閉可能である。光分岐モジュール4の後面側(図5、図6左側)には、局外光ケーブル(成端ケーブル)Kから導出された4心光ファイバテープ8aと、心線選択装置から導出された1本の8心光ファイバテープ8bが導入される。光分岐モジュール4内には、4個のファイバ形光カプラ9が収納されており、心線選択装置側の光ファイバテープ8bは、8心MTコネクタ10により、光カプラ9側の8心光ファイバテープに接続される。

【0006】次に、局外光ケーブル(成端ケーブル)側の光ファイバテープ8aは、4心MTコネクタ10により、光カプラ9側の光ファイバテープ(図示せず)に接続される。一方、光カプラ9の局内側のポートから導出される1本の4心光ファイバテープは、光コード8wとしてパッケージ外部へ導出され、さらに、側板に固定された多心単心分岐器Fにて単心光ファイバ8yへ分岐される。分岐された各単心光ファイバ8yの先端は、SC形プラグへ成端されており、フレーム1の端子板2に固定されたSC形光アダプタ3へ接続される。

【0007】この光分岐モジュール4は、前記フレーム1の各段に、例えば13.5mm幅で、一段に50個程度設けられる。光分岐モジュール4の内部には、光コード8wと、該光コード8wに接続された光カプラ9と、光ファイバテープ8a、8bと光コード8wとを接続切り替え可能に光接続するMTコネクタ10(Mechanically Transferable)とが収納されている。光分岐モジュール4の収納時に上側となる側部には、フレーム1の各段の上部に架設された吊り下げレール11から吊り下げるための吊り下げ部材12が取り付けられている。

**【0008】**

【発明が解決しようとする課題】ところで、前記のような光分岐モジュール4の場合、部品点数が多い上、収容心線数の増大や実装密度の高度化の要求に鑑みて各段に十分な広さが確保されていないため、狭隘な空間において光コネクタ3等の光部品の取付作業を行なわねばならず、作業性が極めて悪かった。また、特定の1個の光分岐モジュール4の交換においても、その光分岐モジュール4の近傍の光分岐モジュール4も取り外して作業者の手が入る程度の空間を確保する必要があり、光配線架の高密度化に伴い作業に困難をきたすようになってきた。

【0009】すなわち、心線の切り替えに際して光分岐

モジュール4内に収納されたMTコネクタ10を切り替えるために光ファイバ切替接続システムを使用する場合には、図6に示すように、該当の光分岐モジュール4をフレーム1から引き出して棚に載置し、引き出した光分岐モジュール4内を開放して、内部からMTコネクタ10を引き出すが、光分岐モジュール4内のMTコネクタ10の引き出し時には、光コード8wなどに接続されている前記光カプラ9やフィルタ等（図示せず）の光部品まで一緒に引き出すこととなり、活線状態では光通信に影響を与えることなく作業を行うことが困難になっていた。

【0010】前記光配線架にあつては、収容心線数の増大に伴いさらなる実装密度の向上の要求があるが、前述した光分岐モジュール4を引き出すための各光分岐モジュール間の空間やMTコネクタ10で接続切り替えるための作業場所を確保する必要があるため、実装密度の向上には限界があった。

【0011】本発明は、前述の課題に鑑みてなされたもので、光分岐モジュールを載置するような引出用の作業スペースを削減して実装密度を向上することができるとともに、接続切り替え等の作業時に光通信に与える影響を可及的に軽減することができる光分岐モジュールを提供することを目的とするものである。

【0012】

【課題を解決するための手段】本発明の光分岐モジュールでは、分岐接続用光コネクタを一端部に支持し、途中に光カプラが介在された光ファイバを内部に収納する本体と、光ファイバ同士を切り替え可能に接続する切替用コネクタおよびその接続余長を収納し、本体の前記分岐接続用光コネクタと対向する端部において出沒自在に設けられ、本体から離間した際に接続余長が引出余長として引き出される可動余長収納部とを備えることを前記課題の解決手段とした。本発明の光分岐モジュールの作用としては、本体に対して可動余長収納部を引き出して、切替用光コネクタの切り替え作業や、可動余長収納部内の他の光部品の交換やメンテナンスを行なう。こうすることにより、本体を引き出す必要が無いので、本体内の光部品や隣設された光分岐モジュール内の光部品に影響を与えることなく作業を行なえるとともに、引き出した切替用光コネクタの再収納も容易である。また、可動余長収納部を本体に対して引き出した場合には、可動余長収納部から引き出された光ファイバが引出余長として機能する。

【0013】

【発明の実施の形態】以下本発明の第1の実施の形態を、図1および図2を参照して説明する。図中符号20は本実施の形態の光分岐モジュールである。図中、前記図3から図7と同一の構成部分には同一の符号を付し、その説明を簡略化する。光分岐モジュール20は、図3および図4記載の前記フレーム1に収納されるものであ

る。

【0014】前記光分岐モジュール20は、図1および図2に示すように、支持手段21を介してフレーム1内の定位置に支持可能に構成され、該支持時にフレーム1外側に臨む一端部22に局内装置側への分岐接続用光コネクタ23が設置され、該分岐接続用光コネクタ23に接続された4心または8心の複数本の光ファイバテープ25（多心光ファイバ）および該光ファイバテープ25の途中に介在された光カプラ28や分岐部29等の光部品を内部に収納する薄板状の本体24と、光ケーブルKから導出された光ファイバテープ8a、8b（光ファイバ）と光ファイバテープ25とを切り替え可能に接続する切替用コネクタとしてのMTコネクタ26およびその接続余長25aを収納し、本体24の前記分岐接続用光コネクタ23と対向する端部において出沒自在に設けられ、本体24から離間した際に接続余長25aが引き出されて引出余長として機能する可動余長収納部27とを備えている。

【0015】前記本体24は、プラスチック等の軽量な素材からなり、外面視長方形板状の有底角筒体である。この本体24の長方形の短辺方向の一側端面の前記分岐接続用コネクタ23寄りの部分には、前記支持手段21として吊具30（21）が取り付けられている。この吊具30は、フレーム1における光分岐モジュール20を配置する段の上段の仕切板5に設けた図示しない係合部に局外側（図1左側）から係合することにより、本体24を所定の向き（端子板2に対して垂直、かつ仕切板5に対して垂直）な平面内に位置決めする。なお、吊具30の位置は、図示したものに限られない。また、支持手段21としては、前記吊具30以外、本体24を前記所定の向きに位置決め可能なものであれば、他の構成であってもよい。

【0016】本体24の一端部22には、分岐接続用コネクタ23を支持するための端面板31が設けられている。この端面板31の上部（図1上側）には、コネクタ支持穴32が開口されている。このコネクタ支持穴32には、分岐接続用コネクタ23が光ファイバ心線同士を光接続する接続軸線を端面板31と垂直として嵌め込まれている。端面板31の局内側端面には、フレーム1に挿入した光分岐モジュール20が前記吊具30を中心として揺動することを防止する振れ止めピン31aが突設されている。

【0017】分岐接続用コネクタ23は、位置決め用リングスリーブが内蔵された多心SC形の光アダプタであつて、分岐部29によって単心分岐された光ファイバテープ25の先端を成端するSCプラグ23aが着脱されるようになっている。分岐部29は、光カプラ28から出た光ファイバテープ25に単心光ファイバを融着して多心単心分岐するようになっている。分岐接続用コネクタ23には、局内側光ファイバ心線7を成端するSCプ

ラグ23bが外側から挿抜可能に差し込まれるようになっている。光カプラ28は、基板導波路型であって、光フィルタを内蔵している。

【0018】本体24の内壁面には、前記光ファイバテープ25の余長を規定以上の半径を維持して湾曲させて収納するための半径維持突起33が複数突設されている。これら半径維持突起33は、光ファイバテープ25を規定以上の半径で湾曲可能な程度の半径で湾曲された円弧状のフランジであって、本体24の内壁面において一列に連設されている。これら半径維持突起33が連設領域の両側方には、光カプラ28や分岐部29を支持するための光部品支持部34が設けられている。

【0019】本体24の局外側端部には、前記可動余長収納部27をガイドして本体24に対して本体24の長手方向に沿ってスライド移動自在とするガイド部35が突設されている。このガイド部35は、本体24の断面方向一側部を本体24の局外側に突出させた部分である。このガイド部35の上端部(図1上側)には、可動余長収納部27に設けられた図示しない係合部と係合して可動余長収納部27を吊下げた状態でスライド移動自在に支持し、ガイド部35の局外側において出脱可能とするレール36が設けられている。

【0020】ガイド部35の基端部には、可動余長収納部27の局内側への移動を規制する規制板37が設けられている。この規制板37は、本体24の長手方向略中央部に位置し、本体24の厚さ方向に延在して、本体24に光ファイバテープ25の余長を収納可能な余長収納部38を画成している。規制板37の余長収納部38側には、光ファイバテープ25を引き留めるコード引留具37aが取り付けられている。

【0021】ガイド部35の局外側端部には、本体24をフレーム1の局外側から局内側に向けて挿入した際に本体24をその挿入方向において位置決めする樹脂製の位置決め部材35aが突設されている。位置決め部材35aは、本体24をフレーム1に挿入した際に、先端がフレーム1の図示しない止め穴に挿入されることにより、本体24をフレーム1に対して位置決めするようになっている。止め穴に挿入された位置決め部材35aは、止め穴にさらに押し込むことにより先端が拡張して、フレーム1に対して仮留めされるようになっている。位置決め部材35aは、フレーム1内に挿入された本体24をフレーム1の局外側に引き出すための引き出しつまみとしても利用することができる。

【0022】前記可動余長収納部27は、前記ガイド部35のレール36に移動自在として吊り下げられた長方形の基板39と、この基板39の中央部において基板39に垂直な軸線を以て回動自在に設けられた正円形の円板40とを備えている。基板39は、前記ガイド部35に収納可能な大きさの長方形板であって、中央部に前記円板40を回動自在として収納することができる円形

凹部41を有している。円板40は、直径方向に延在する溝42を介して互いに突き合わせ状態になっている2つの半円部43を有している。各半円部43の中央部には、その外側に巻装された光ファイバテープ8a、8bの湾曲半径を維持する略楕円形のマンドレル44が突出されている。各半円部43は、円形凹部41の内周面とマンドレル44の外周面との間に光ファイバテープ8a、8bを規定以上の湾曲半径を維持して収納するようになっている。前記溝42の中央部には、前記MTコネクタ26を挟持して支持するためのコネクタ支持部45が設けられている。

【0023】なお、円板40は、基板39の円形凹部41に円板40の外周面の半分以上が覆われ、しかも、外周面が円形凹部41の内周面とそれぞれ周方向に延在する図示しない突条と溝とで凹凸係合されているので、円形凹部41から脱落することはない。円板40の下部は、円形凹部41の開放された下方に露出されているので、この露出した部分を利用して光ファイバテープ8a、8bを容易に巻装できるようになっている。また、円板40に巻装された光ファイバテープ8a、8bは、円板40の外周面に着脱自在に装着された蓋40aによって、円板40の外方に突出しないように収められている。円板40は、正円形以外、楕円形等であってもよい。また、円板40と円形凹部41とは、相対回転の範囲が設定された形状であっても構わない。

【0024】図示した光分岐モジュール20にあっては、それぞれコード化された1本の光ファイバテープ8aと2本の光ファイバテープ8bとが導入されている。これら光ファイバテープ8a、8bは、4心または8心のMTコネクタ26を介してそれぞれ同一心数の光ファイバテープ25と切り替え可能に接続されている。MTコネクタ26をコネクタ支持部45に支持した際に生じる光ファイバテープ25の接続余長25aは、マンドレル44の外周面に巻回されて可動余長収納部27内に収納されている。光ファイバテープ25は3本を要する。また、MTコネクタ26は3個を要する。これらMTコネクタ26のいずれにも、光ファイバテープ25が接続されている。

【0025】光ファイバテープ25は、余長収納部38内において、半径維持突起33によって規定以上の湾曲半径で湾曲されて収納され、その途中において介在した光カプラ28や分岐部29を経て、前記分岐接続用コネクタ23を介して局内光ファイバ心線7と切り替え可能に接続されている。前記分岐接続用コネクタ23としては、4心のものが2連として用いられている。

【0026】本発明の光分岐モジュールは、局外側から導入された複数本の光ファイバテープ8a、8bを可動余長収納部27において前記MTコネクタ26を介して光ファイバテープ25と切り替え可能に接続するとともに、前記光ファイバテープ25の単心分岐した先端を接

続した分岐接続用コネクタ23を介して局内光ファイバ心線7と切り替え可能に接続し、光ファイバテープ25の余長を余長収納部38内に規定以上の湾曲半径を維持して収納し、光分岐モジュール20をフレーム1の適切位置に収納する。また、光ファイバテープ25のMTコネクタ26における接続余長25aをマンドレル44の外周部に巻装して収納する。

【0027】フレーム1に収納した光分岐モジュール20において、MTコネクタ26での接続を切り替えるには、可動余長収納部27を本体24に対して局外側に引き出してMTコネクタ26を該MTコネクタ26に接続されている光ファイバテープ8a、8b、25ごとに取り出し、切り替え作業を行なう。この際、円板40は、円形凹部41に対して回転可能になっているので、可動余長収納部27の引き出しに伴って回転してマンドレル44外側に巻装されている光ファイバテープ25の接続余長25aが巻き出され、引出余長として機能する。巻き出された接続余長25aは、コード引留具37aによって引き留められているので、本体24内に収納されている光ファイバテープ25に引張力が作用することが無く、本体24内の光部品に影響を与えることなく効率良く作業を行なうことができる。

【0028】MTコネクタ26を再収納する際には、円板40を回転することにより、MTコネクタ26に接続されている光ファイバテープ8a、8b、25の余長をマンドレル44の外周面に巻装する。こうすることにより、各光ファイバテープ8a、8b、25同士が絡むことなく、効率良く再収納することができる。また、分岐接続用コネクタ23において、局内光ファイバ心線7を差し替えるか、光分岐モジュール20をフレーム1から引き出して光ファイバテープ25のSCプラグ23aを分岐接続用コネクタ23に対して差し替える。さらに、光分岐モジュール20をフレーム1に対して挿抜するには、位置決め部材35aを利用して光分岐モジュール20をフレーム1に対して移動する。

【0029】したがって、本発明の光分岐モジュール20によれば、複数本の光ファイバテープ8a、8b、25を省スペースで収納することができるので、実装密度が向上するとともに、可動余長収納部27を本体24に対して引き出し、再収納するだけで光ファイバテープ8a、8b、25の余長やMTコネクタ26等の光部品を一体的に引き出し、再収納でき、MTコネクタ26における接続切り替え時には本体24を引き出す必要が無いので、本体24内の光部品や隣設された光分岐モジュール20内の光部品に影響を与えることなく作業を行なうとともに、引き出した光部品の再収納も容易である。この結果、光ファイバテープ8a、8bと光ファイバテープ25との接続切り替えを、活線状態のまま行なうことが可能となる。

【0030】また、局外側に引き出し可能な可動余長収

納部27において回転自在の円板40を採用したことにより、可動余長収納部27の引出余長を収納するスペースの設置が不要であり、フレーム1の奥行き方向の寸法を縮小することができ、光ファイバテープ8a、8b、25や分岐接続用コネクタ23の実装密度が一層向上する。加えて、光配線架において隣設した光分岐モジュール20間に接続切替用の作業スペースを確保する必要が無いので、光分岐モジュール20同士を接近させて設置することができる。光配線架における光分岐モジュール20の実装密度が向上して、より多心の光ケーブルKに対応することができる光配線架を提供することができる。

【0031】なお、本発明の光分岐モジュールは、光配線架以外、光配線盤や光成端箱等にも適用することができる。

#### 【0032】

【発明の効果】以上説明したように、本発明の光分岐モジュールによれば、分岐接続用光コネクタを一端部に支持し、途中に光カプラが介在された光ファイバを内部に収納する本体と、光ファイバ同士を切り替え可能に接続する切替用コネクタおよびその接続余長を収納し、本体の前記分岐接続用光コネクタと対向する端部において出沒自在に設けられ、本体から離間した際に接続余長が引出余長として引き出される可動余長収納部とを備え、本体において複数本の光ファイバを省スペースで収納することができるので、実装密度が向上するとともに、可動余長収納部を本体に対して出沒させるだけで光ファイバの余長や切替用コネクタ等の光部品を一体的に引き出せて、切替用コネクタにおける接続切り替え時には本体を引き出す必要が無いので、本体内の光カプラ等の光部品や隣設された光分岐モジュール内の光部品に影響を与えることなく接続切り替え作業を行なうことができ、しかも引き出した光部品の再収納が容易になるといった優れた効果を奏する。

#### 【図面の簡単な説明】

【図1】 本発明の光分岐モジュールの実施の形態を示す側断面図である。

【図2】 図1の光分岐モジュールを示す斜視図である。

【図3】 光配線架を示す側面図である。

【図4】 光配線架を示す正面図である。

【図5】 従来の光分岐モジュールを示す側面図である。

【図6】 従来の光分岐モジュールを示す図であって、MTコネクタでの接続切り替えを示す側面図である。

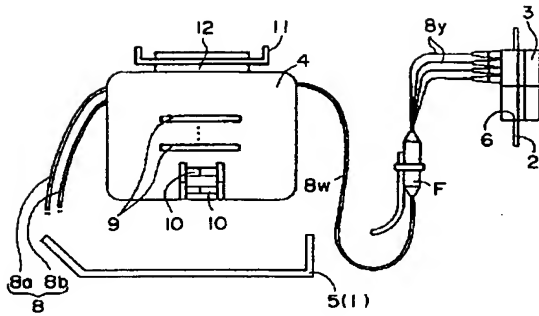
【図7】 光分岐モジュールの基本構成を示す略図である。

#### 【符号の説明】

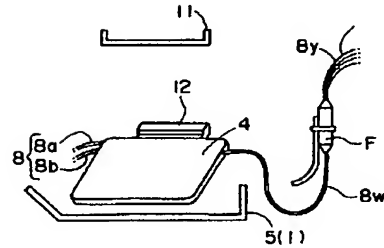
1…フレーム、7…光ファイバ心線（局内光ファイバ心線）、8…光ファイバテープ、20…光分岐モジュール、21…支持手段、22…端部、23…分岐接続用コ



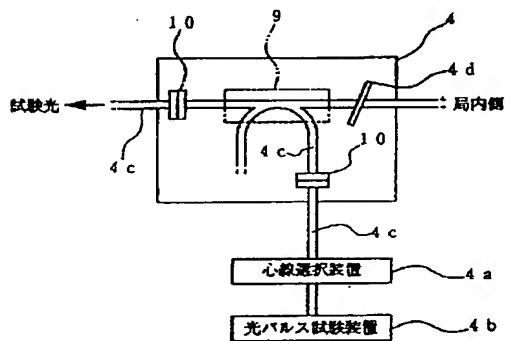
【図5】



【図6】



【図7】



フロントページの続き

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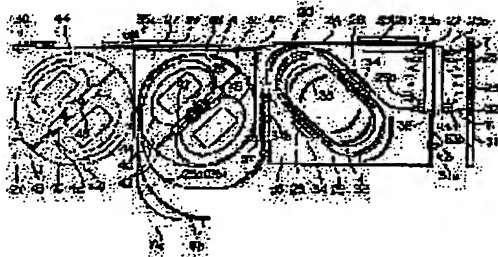
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## (54) OPTICAL BRANCHING MODULE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To improve the packaging density and to reduce the adverse effect on an optical communication during a work such as a connection switching by providing a moveable extra-length storage section from which a connection extra-length is pulled out as a pulled extra-length while it is separated from a main body.

**SOLUTION:** In order to switch the connection at an MT connector 26 in the optical branching module stored in a frame, a moveable extra-length storage section 27 is pulled out to the outer side of the station with respect to a main body 24, an MT connector 26 is taken out with optical fiber tapes 8a, 8b and 25, which are connected to the connector 26, and the switching work is executed. Since a circular plate 40 is made





rotative with respect to a circular recessed part 41, the plate 40 rotates as the section 27 is pulled out and a connection extra-length 25a of the tape 25, which is wound outside a mandrel 44, is rewound and functions as a pulled out extra-length. Since the re-wound extra-length 25a is restrained by a cord restraining jig 37a, the work is accomplished without giving an adverse effect to the optical parts in the body 24.

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**CLAIMS**

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[Claim(s)]

[Claim 1] It is an optical branching module (20) for carrying out multipoint connection of the multi-core optical fiber (8a, 8b) to a plastic coated fiber (7) by optical connector connection. The body which contains the optical fiber (25) with which the optical connector for multipoint connection (23) was supported in the end section (22), and the optical coupler (28) intervened on the way inside (24), The connector for a change (26) which connects optical fibers switchable, and its spare length for joint (25a) are contained. The optical branching module characterized by having the movable extra length section (27) by which a spare length for joint is pulled out as drawer extra length when it is prepared free [ frequent appearance ] in said optical connector for multipoint connection of a body, and the edge which counters and estranges from a body.

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[Translation done.]

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the optical branching module for inserting trial light in the optical-center line for a communication link.

[0002]

[Description of the Prior Art] In an optical fiber network, in order to carry out multipoint connection of the optical cable to a plastic coated fiber by optical connector connection, the optical wiring rack which carries out termination of many office outdoor daylight fibers, and is considered as a large herd configuration is used. FTM (Fiber Termination Module) is used as an optical wiring rack used especially for a subscriber system transmission line.

Drawing 3 and drawing 4 are drawings showing the conventional optical wiring rack applied to FTM, and, for a sign 1, as for a terminal assembly and 3, a frame and 2 are [ an optical connector and 4 ] optical branching modules among drawing.

[0003] Said frame 1 is formed in ledged [ which was divided into two or more steps at equal intervals ] by the dashboard 5 arranged horizontally, and two or more steps of stages which contain said optical branching module 4 are formed. The abbreviation wrap terminal assembly 2 is being fixed to same side opening of each stage of this frame 1 in this opening. Two or more holes 6 for installation of said optical connector 3 arrange, and are formed successively by this terminal assembly 2, and arrangement and immobilization of two optical connectors 3 of well-known SC form are done at a time into this hole 6. As for this optical connector 3, SC form terminal by which the office plastic coated fiber 7 is connected outside and which is not illustrated is arranged in the location corresponding to the terminal for said office plastic coated fiber 7 in two or more SC form terminals by which two or more arrangement is carried out and an outside plastic coated fiber is

connected inside and which are not illustrated.

[0004] Hereafter, the basic configuration of the optical branching module 4 is shown in drawing 7 R> 7. As shown in drawing 7, in the optical branching module 4, the optical components of the optical connector 10 grade for changing the optical coupler 9, 4d of optical filters, and optical fiber 4c, and connecting are contained. In order to perform trial and management of a beam-of-light way, the optical branching module which contains the core wire used as a test objective first is chosen in core-wire selecting arrangement 4a. The trial light (light pulse) sent out from light pulse testing-device 4b is sent out to optical fiber 4c by the side of the outside which serves as the measuring object via the optical coupler 9. Furthermore, the back scattered light generated in the optical fiber 4c concerned is received by the light sensing portion of light pulse testing-device 4b via the optical coupler 9, and, subsequently the monitor of the abnormalities in loss of a beam-of-light way is carried out by analyzing the wave of the received back scattered light.

[0005] If the conventional branching module for 4 alignments is explained along with drawing 5 and drawing 6, this optical branching module can be opened and closed with the closing motion lid which is a sheet metal-like package as a whole and is not illustrated. 4 alignment optical fiber tape 8a drawn from outside optical cable (termination cable) K and one 8 alignment optical fiber tape 8b drawn from the core-wire selecting arrangement are introduced into the rear-face side ( drawing 5, drawing 6 left-hand side) of the optical branching module 4. In the optical branching module 4, four fiber form light couplers 9 are contained, and optical fiber tape 8b by the side of a core-wire selecting arrangement is connected to 8 alignment optical fiber tape by the side of the optical coupler 9 by the 8 alignment MT connector 10.

[0006] Next, optical fiber tape 8a by the side of an outside optical cable (termination cable) is connected to the optical fiber tape by the side of the optical coupler 9 (not shown) by the 4 alignment MT connector 10. On the other hand, one 4 alignment optical fiber tape drawn from the port by the side of the office of the optical coupler 9 is drawn as optical code 8w in the package exterior, and branches to single alignment optical fiber 8y further by the multi-core single alignment turnout F fixed to the side plate. Termination of the tip of each branched \*\*\*\* optical fiber 8y is carried out to SC form plug, and it is connected to SC form light adapter 3 fixed to the terminal assembly 2 of a frame 1.

[0007] This optical branching module 4 is for example, 13.5mm width of face, and is prepared in each stage of said frame 1 in one steps [ about

50 ]. the optical coupler 9 connected to optical code 8w and this optical code 8w inside the optical branching module 4, and the optical fiber tapes 8a and 8b and optical code 8w -- connection -- the MT connector 10 (Mechanically Transferable) which makes optical connection switchable is contained. The hanging member 12 for [ which is hung and is hung from a rail 11 ] having been constructed over the upper part of each stage of a frame 1 is attached in the flank which serves as the bottom at the time of receipt of the optical branching module 4.

[0008]

[Problem(s) to be Solved by the Invention] By the way, since sufficient size for each stage was not secured a top with many components mark in view of increase of the number of hold core wire, or the demand of an advancement of packaging density in the case of the above optical branching modules 4, in narrow space, attachment of the optical components of optical connector 3 grade had to be performed, and workability was very bad. Moreover, it is necessary to secure the space which is extent into which the optical branching module 4 near the optical branching module 4 is also removed, and an operator's hand goes, and has come to cause difficulty to an activity in connection with the densification of an optical wiring rack also in exchange of one specific optical branching module 4.

[0009] namely, in order to change the MT connector 10 contained in the optical branching module 4 on the occasion of the change of core wire, in using an optical fiber change connection system Although the inside of the optical branching module 4 which pulled out the optical branching module 4 of relevance from the frame 1, and was laid and pulled out on the shelf is opened wide and the MT connector 10 is pulled out from the interior as shown in drawing 6 At the time of the drawer of the MT connector 10 in the optical branching module 4, it was difficult to work without even optical (not shown) components connected to optical code 8w etc., such as said optical coupler 9, filter, etc., pulling out together, and affecting optical communication in the state of a live wire.

[0010] Since it was necessary to secure the work site for carrying out a connection change by the space and the MT connector 10 of each optical branching inter module for pulling out the optical branching module 4 mentioned above although there is a demand of improvement in the further packaging density with increase of the number of hold core wire if it is in said optical wiring rack, there was a limitation in improvement in packaging density.

[0011] This invention was made in view of the above-mentioned technical

problem, and it aims at offering the optical branching module which can mitigate the effect which it has on optical communication at the time of the activity of a connection change etc. as much as possible while being able to reduce workspaces for drawers in which an optical branching module is laid and being able to improve packaging density.

[0012]

[Means for Solving the Problem] The body which contains the optical fiber with which the optical connector for multipoint connection was supported in the end section, and the optical coupler intervened on the way by the optical branching module of this invention inside, The connector for a change which connects optical fibers switchable, and its spare length for joint are contained. When it was prepared free [ frequent appearance ] in said optical connector for multipoint connection of a body, and the edge which counters and estranged from a body, the spare length for joint made it the solution means of said technical problem to have the movable extra length section pulled out as drawer extra length. As an operation of the optical branching module of this invention, the movable extra length section is pulled out to a body, and the change activity of the optical connector for a change, exchange of other optical components of movable extra length circles, and a maintenance are performed. Since there is no need of pulling out a body by carrying out like this, while being able to work without affecting the optical components within a body, and the optical components in the optical branching module by which proximal was carried out, re-receipt of the pulled-out optical connector for a change is also easy. Moreover, when the movable extra length section is pulled out to a body, the optical fiber pulled out from the movable extra length section functions as drawer extra length.

[0013]

[Embodiment of the Invention] The gestalt of operation of the 1st of this invention is explained with reference to drawing 1 and drawing 2 below. The sign 20 in drawing is the optical branching module of the gestalt of this operation. The same sign is given to the same component as drawing 7 from said drawing 3 among drawing, and the explanation is simplified. The optical branching module 20 is contained by said frame 1 drawing 3 and given in drawing 4 .

[0014] Said optical branching module 20 is constituted possible [ support ] through a support means 21 by the orientation in a frame 1, as shown in drawing 1 and drawing 2 . The optical connector 23 for multipoint connection by the side of office equipment is installed in the end section 22 which attends frame 1 outside at the time of this support. The body 24 of the shape of sheet metal which contains the optical components of the

optical coupler 28 which intervened in the middle of and tee 29 grade inside, [ two or more optical fiber tapes 25 (multi-core optical fiber) of four alignments connected to this optical connector 23 for multipoint connection, or eight alignments, and this optical fiber tape 25 ] The MT connector 26 as a connector for a change which connects the optical fiber tapes 8a and 8b (optical fiber) drawn from optical cable K and the optical fiber tape 25 switchable, and its spare-length-for-joint 25a are contained. In said optical connector 23 for multipoint connection of a body 24, and the edge which counters, it was prepared free [ frequent appearance ], and when it estranges from a body 24, it has the movable extra length section 27 which spare-length-for-joint 25a is pulled out, and functions as drawer extra length.

[0015] Said body 24 consists of lightweight materials, such as plastics, and is a closed-end rectangular pipe object of outside \*\*\*\*\*. The suspender 30 (21) is attached in the part of said connector 23 approach for multipoint connection of the 1 side-edge side of the direction of a shorter side of the rectangle of this body 24 as said support means 21. This suspender 30 positions a body 24 in the flat surface which predetermined turns to (perpendicular [ to a perpendicular and a dashboard 5 ] to a terminal assembly 2) by engaging with the engagement section which was prepared in the dashboard 5 of the upper case of the stage which arranges the optical branching module 20 in a frame 1 and which is not illustrated from an outside side ( drawing 1 left-hand side). In addition, the location of a suspender 30 is not restricted to what was illustrated. Moreover, as a support means 21, as long as positioning to said predetermined sense is possible in a body 24 except said suspender 30, you may be other configurations.

[0016] The edge face-plate 31 for supporting the connector 23 for multipoint connection is formed in the end section 22 of a body 24. Opening of the connector support hole 32 is carried out to the upper part (on drawing 1 ) of this edge face-plate 31. The connector 23 for multipoint connection is inserted in this connector support hole 32 considering the connection axis which makes optical connection of the plastic coated fibers as perpendicular to the edge face-plate 31. Bracing pin 31a which prevents that the optical branching module 20 inserted in a frame 1 rocks said suspender 30 as a core protrudes on the office side edge side of the edge face-plate 31.

[0017] SC plug 23a which carries out termination of the tip of the optical fiber tape 25 in which the connector 23 for multipoint connection is the optical adapter of the multi-core SC form where the ring sleeve for positioning was built in, and single alignment branching was carried out by

the tee 29 is detached and attached. A tee 29 welds a single alignment optical fiber to the optical fiber tape 25 which came out of the optical coupler 28, and carries out multi-core single alignment branching. SC plug 23b which carries out termination of the office side plastic coated fiber 7 is inserted in the connector 23 for multipoint connection possible [ insert and remove ] from an outside. The optical coupler 28 is a substrate waveguide mold, and contains the optical filter.

[0018] Two or more protrusions of the radius maintenance projection 33 for maintaining the radius beyond a convention, incurvating the extra length of said optical fiber tape 25, and containing him are carried out at the internal surface of a body 24. These radii maintenance projection 33 is the flange of the shape of radii which curved the optical fiber tape 25 with a radius of extent which can curve the radius beyond a convention, and are formed successively by the single tier in the internal surface of a body 24. The optical components supporter 34 for these radii maintenance projection 33 to support the optical coupler 28 and a tee 29 to the method of both sides of a successive formation field is formed.

[0019] The guide section 35 whose slide migration guides said movable extra length section 27, and is enabled along with the longitudinal direction of a body 24 to a body 24 protrudes on the outside side edge section of a body 24. This guide section 35 is the part which made direction of cross section 1 flank of a body 24 project to the outside side of a body 24. Where it engaged with the engagement section which was prepared in the movable extra length section 27 and which is not illustrated and the movable extra length section 27 is hung, it supports in the upper limit section (on drawing 1 ) of this guide section 35 free [ slide migration ], and the rail 36 whose frequent appearance is enabled at the outside side of the guide section 35 is formed in it.

[0020] The regulation plate 37 which regulates the migration by the side of the office of the movable extra length section 27 is formed in the end face section of the guide section 35. This regulation plate 37 is located in the longitudinal direction abbreviation center section of the body 24, extends in the thickness direction of a body 24, and is forming the extra length section 38 which can contain the extra length of the optical fiber tape 25 on the body 24. Code anchor implement 37a which keeps back the optical fiber tape 25 is attached in the extra length section 38 side of the regulation plate 37.

[0021] When a body 24 is turned and inserted in an office side from the outside side of a frame 1, positioning member 35a made of resin which positions a body 24 in the path of insertion protrudes on the outside side



edge section of the guide section 35. When positioning member 35a inserts a body 24 in a frame 1, it positions a body 24 to a frame 1 by inserting a tip in the stop hole which a frame 1 does not illustrate. By pushing into a stop hole further, a tip expands the diameter of positioning member 35a inserted in the stop hole, and a temporary stop is carried out to a frame 1.

Positioning member 35a can be used also as a drawer tongue for pulling out the body 24 inserted into the frame 1 to the outside side of a frame 1. [0022] the center section of the rectangle-like substrate 39 hung as migration on the rail 36 of said guide section 35 being free for said movable extra length section 27, and this substrate 39 -- setting -- an axis perpendicular to a substrate 39 -- with, forward [ which was established free / rotation ] -- it has the circular disk 40. A substrate 39 is a rectangular plate of the magnitude which can be contained in said guide section 35, and has the circular crevice 41 which can contain said disk 40 as rotation being free in the center section. The disk 40 has the two semicircle sections 43 which compare mutually through the slot 42 which extends in the diameter direction, and are in the condition. In the center section of each semicircle section 43, the mandrel 44 of the abbreviation ellipse form where the curve radius of the optical fiber tapes 8a and 8b \*\*\*\*(ed) by the outside is maintained bulges. Between the inner skin of the circular crevice 41, and the peripheral face of a mandrel 44, each semicircle section 43 maintains the curve radius beyond a convention, and contains the optical fiber tapes 8a and 8b. The connector supporter 45 for pinching and supporting said MT connector 26 is formed in the center section of said slot 42.

[0023] In addition, more than one half of the peripheral face of a disk 40 is covered with the circular crevice 41 of a substrate 39, and moreover, since concavo-convex engagement of the peripheral face is carried out in the inner skin of the circular crevice 41, the protruding line which extends in a hoop direction, respectively and which is not illustrated, and the slot, a disk 40 is not omitted from the circular crevice 41. Since it is exposed to the lower part by which the circular crevice 41 was opened wide, the lower part of a disk 40 can \*\*\*\* easily the optical fiber tapes 8a and 8b using this exposed part. Moreover, the optical fiber tapes 8a and 8b \*\*\*\*(ed) by the disk 40 are stored by lid 40a with which the external surface side of a disk 40 was equipped free [ attachment and detachment ] so that it may not project in a way outside a disk 40. A disk 40 may be an ellipse form etc. except circular [ forward ]. Moreover, a disk 40 and the circular crevice 41 may be the configurations to which the range of relative rotation was set.

[0024] If it is in the illustrated optical branching module 20, one optical fiber tape 8a and two optical fiber tape 8b which were coded, respectively are

introduced. These optical fiber tapes 8a and 8b are connected with the optical fiber tape 25 of the number of the same alignments switchable through the MT connector 26 of four alignments or eight alignments, respectively. Spare-length-for-joint 25a of the optical fiber tape 25 produced when the MT connector 26 is supported to the connector supporter 45 is \*\*\*\*(ed) by the peripheral face of a mandrel 44, and is contained in the movable extra length section 27. The optical fiber tape 25 requires three. Moreover, three MT connectors 26 are required. The optical fiber tape 25 is connected to all of these MT connector 26.

[0025] In the extra length section 38, the optical fiber tape 25 curves, is contained by the radius maintenance projection 33 in the curve radius beyond a convention, and is connected with the office plastic coated fiber 7 switchable through said connector 23 for multipoint connection through the optical coupler 28 and tee 29 by which it was placed between the middles. As said connector 23 for multipoint connection, the thing of four alignments is used as 2 reams.

[0026] While the optical branching module of this invention connects with the optical fiber tape 25 two or more optical fiber tapes 8a and 8b introduced from the outside side switchable through said MT connector 26 in the movable extra length section 27 It connects with the office plastic coated fiber 7 switchable through the connector 23 for multipoint connection which connected the tip as for which said optical fiber tape 25 carried out single alignment branching. In the extra length section 38, the curve radius beyond a convention is maintained, the extra length of the optical fiber tape 25 is contained, and the optical branching module 20 is contained in the suitable location of a frame 1. Moreover, spare-length-for-joint 25a in the MT connector 26 of the optical fiber tape 25 is \*\*\*\*(ed) and contained in the periphery section of a mandrel 44.

[0027] the optical fiber tapes 8a and 8b which pull out the movable extra length section 27 to an outside side to a body 24 and by which the MT connector 26 is connected to this MT connector 26 in the optical branching module 20 contained on the frame 1 in order to change connection by the MT connector 26 -- it takes out the whole 25 and a change activity is done. Under the present circumstances, since the disk 40 is pivotable to the circular crevice 41, spare-length-for-joint 25a of the optical fiber tape 25 which rotates in connection with the drawer of the movable extra length section 27, and is \*\*\*\*(ed) by mandrel 44 outside begins to be rolled, and it functions as drawer extra length. Since code anchor implement 37a has kept back spare-length-for-joint 25a which began to be rolled, it can work efficiently, without tensile force's not acting on the optical fiber tape 25

contained in the body 24, and affecting the optical components within a body 24.

[0028] In case the MT connector 26 is re-contained, extra length of the optical fiber tapes 8a, 8b, and 25 connected to the MT connector 26 is \*\*\*\* (ed) to the peripheral face of a mandrel 44 by rotating a disk 40. It can re-contain efficiently, without involving each optical fiber tapes 8a and 8b and 25 comrades by carrying out like this. Moreover, in the connector 23 for multipoint connection, the office plastic coated fiber 7 is substituted, or the optical branching module 20 is pulled out from a frame 1, and SC plug 23a of the optical fiber tape 25 is substituted to the connector 23 for multipoint connection. Furthermore, in order to carry out the insert and remove of the optical branching module 20 to a frame 1, the optical branching module 20 is moved to a frame 1 using positioning member 35a.

[0029] Therefore, since two or more optical fiber tapes 8a, 8b, and 25 can be contained by space-saving according to the optical branching module 20 of this invention While packaging density improves, the movable extra length section 27 is pulled out to a body 24. Since the optical components of the extra length of the optical fiber tapes 8a, 8b, and 25 or MT connector 26 grade are pulled out in one, and can be re-contained only by re-containing and there is no need of pulling out a body 24, at the time of the connection change in the MT connector 26 While being able to work without affecting the optical components within a body 24, and the optical components in the optical branching module 20 by which proximal was carried out, re-receipt of the pulled-out optical components is also easy. Consequently, it becomes possible to perform a connection change on the optical fiber tapes 8a and 8b and the optical fiber tape 25 with a live-wire condition.

[0030] Moreover, by having adopted as the outside side the disk 40 which can rotate freely in the withdrawal movable extra length section 27, installation of the tooth space which contains the drawer extra length of the movable extra length section 27 is unnecessary, the dimension of the depth direction of a frame 1 can be reduced, and the packaging density of the optical fiber tapes 8a, 8b, and 25 or the connector 23 for multipoint connection improves further. In addition, since there is no need of securing the workspace for a connection change between the optical branching modules 20 which carried out proximal in the optical wiring rack, optical branching module 20 comrades can be made to be able to approach, it can install, the packaging density of the optical branching module 20 in an optical wiring rack can improve, and the optical wiring rack which can respond to multi-core optical cable K can be offered.

[0031] In addition, the optical branching module of this invention is applicable to the optical distributing board, an optical termination box, etc. except an optical wiring rack.

[0032]

[Effect of the Invention] The body which contains the optical fiber with which according to the optical branching module of this invention the optical connector for multipoint connection was supported in the end section, and the optical coupler intervened on the way as explained above inside, The connector for a change which connects optical fibers switchable, and its spare length for joint are contained. In said optical connector for multipoint connection of a body, and the edge which counters, it is prepared free [ frequent appearance ]. Since a spare length for joint can be equipped with the movable extra length section pulled out as drawer extra length and can contain two or more optical fibers by space-saving in a body when it estranges from a body While packaging density improves, optical components, such as extra length of an optical fiber and a connector for a change, can be pulled out in one only by making the movable extra length section appear frequently to a body. Since there is no need of pulling out a body, at the time of the connection change in the connector for a change A connection change activity can be done without affecting optical components, such as an optical coupler within a body, and the optical components in the optical branching module by which proximal was carried out, and the outstanding effectiveness that re-receipt of the optical components moreover pulled out becomes easy is done so.

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**TECHNICAL FIELD**

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[Field of the Invention] This invention relates to the optical branching module for inserting trial light in the optical-center line for a communication link.

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**PRIOR ART**

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[Description of the Prior Art] In an optical fiber network, in order to carry out multipoint connection of the optical cable to a plastic coated fiber by optical connector connection, the optical wiring rack which carries out termination of many office outdoor daylight fibers, and is considered as a large herd configuration is used. FTM (Fiber Termination Module) is used as an optical wiring rack used especially for a subscriber system transmission line.

Drawing 3 and drawing 4 are drawings showing the conventional optical wiring rack applied to FTM, and, for a sign 1, as for a terminal assembly and 3, a frame and 2 are [ an optical connector and 4 ] optical branching modules among drawing.

[0003] Said frame 1 is formed in ledged [ which was divided into two or more steps at equal intervals ] by the dashboard 5 arranged horizontally, and two or more steps of stages which contain said optical branching module 4 are formed. The abbreviation wrap terminal assembly 2 is being fixed to same side opening of each stage of this frame 1 in this opening. Two or more holes 6 for installation of said optical connector 3 arrange, and are formed successively by this terminal assembly 2, and arrangement and immobilization of two optical connectors 3 of well-known SC form are done at a time into this hole 6. As for this optical connector 3, SC form terminal by which the office plastic coated fiber 7 is connected outside and which is not illustrated is arranged in the location corresponding to the terminal for said office plastic coated fiber 7 in two or more SC form terminals by which two or more arrangement is carried out and an outside plastic coated fiber is connected inside and which are not illustrated.

[0004] Hereafter, the basic configuration of the optical branching module 4 is shown in drawing 7 R> 7. As shown in drawing 7 , in the optical branching module 4, the optical components of the optical connector 10 grade for changing the optical coupler 9, 4d of optical filters, and optical fiber 4c, and connecting are contained. In order to perform trial and

management of a beam-of-light way, the optical branching module which contains the core wire used as a test objective first is chosen in core-wire selecting arrangement 4a. The trial light (light pulse) sent out from light pulse testing-device 4b is sent out to optical fiber 4c by the side of the outside which serves as the measuring object via the optical coupler 9. Furthermore, the back scattered light generated in the optical fiber 4c concerned is received by the light sensing portion of light pulse testing-device 4b via the optical coupler 9, and, subsequently the monitor of the abnormalities in loss of a beam-of-light way is carried out by analyzing the wave of the received back scattered light.

[0005] If the conventional branching module for 4 alignments is explained along with drawing 5 and drawing 6, this optical branching module can be opened and closed with the closing motion lid which is a sheet metal-like package as a whole and is not illustrated. 4 alignment optical fiber tape 8a drawn from outside optical cable (termination cable) K and one 8 alignment optical fiber tape 8b drawn from the core-wire selecting arrangement are introduced into the rear-face side ( drawing 5, drawing 6 left-hand side) of the optical branching module 4. In the optical branching module 4, four fiber form light couplers 9 are contained, and optical fiber tape 8b by the side of a core-wire selecting arrangement is connected to 8 alignment optical fiber tape by the side of the optical coupler 9 by the 8 alignment MT connector 10.

[0006] Next, optical fiber tape 8a by the side of an outside optical cable (termination cable) is connected to the optical fiber tape by the side of the optical coupler 9 (not shown) by the 4 alignment MT connector 10. On the other hand, one 4 alignment optical fiber tape drawn from the port by the side of the office of the optical coupler 9 is drawn as optical code 8w in the package exterior, and branches to single alignment optical fiber 8y further by the multi-core single alignment turnout F fixed to the side plate.

Termination of the tip of each branched \*\*\*\* optical fiber 8y is carried out to SC form plug, and it is connected to SC form light adapter 3 fixed to the terminal assembly 2 of a frame 1.

[0007] This optical branching module 4 is for example, 13.5mm width of face, and is prepared in each stage of said frame 1 in one steps [ about 50 ]. the optical coupler 9 connected to optical code 8w and this optical code 8w inside the optical branching module 4, and the optical fiber tapes 8a and 8b and optical code 8w -- connection -- the MT connector 10 (Mechanically Transferable) which makes optical connection switchable is contained. The hanging member 12 for [ which is hung and is hung from a rail 11 ] having been constructed over the upper part of each stage of a

frame 1 is attached in the flank which serves as the bottom at the time of receipt of the optical branching module 4.

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## EFFECT OF THE INVENTION

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[Effect of the Invention] The body which contains the optical fiber with which according to the optical branching module of this invention the optical connector for multipoint connection was supported in the end section, and the optical coupler intervened on the way as explained above inside, The connector for a change which connects optical fibers switchable, and its spare length for joint are contained. In said optical connector for multipoint connection of a body, and the edge which counters, it is prepared free [ frequent appearance ]. Since a spare length for joint can be equipped with the movable extra length section pulled out as drawer extra length and can contain two or more optical fibers by space-saving in a body when it estranges from a body While packaging density improves, optical components, such as extra length of an optical fiber and a connector for a change, can be pulled out in one only by making the movable extra length section appear frequently to a body. Since there is no need of pulling out a body, at the time of the connection change in the connector for a change A connection change activity can be done without affecting optical components, such as an optical coupler within a body, and the optical components in the optical branching module by which proximal was carried out, and the outstanding effectiveness that re-receipt of the optical components moreover pulled out becomes easy is done so.

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## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] By the way, since sufficient size for each stage was not secured a top with many components mark in view of increase of the number of hold core wire, or the demand of an advancement of packaging density in the case of the above optical branching modules 4, in narrow space, attachment of the optical components of optical connector 3 grade had to be performed, and workability was very bad. Moreover, it is necessary to secure the space which is extent into which the optical branching module 4 near the optical branching module 4 is also removed, and an operator's hand goes, and has come to cause difficulty to an activity in connection with the densification of an optical wiring rack also in exchange of one specific optical branching module 4.

[0009] namely, in order to change the MT connector 10 contained in the optical branching module 4 on the occasion of the change of core wire, in using an optical fiber change connection system Although the inside of the optical branching module 4 which pulled out the optical branching module 4 of relevance from the frame 1, and was laid and pulled out on the shelf is opened wide and the MT connector 10 is pulled out from the interior as shown in drawing 6 At the time of the drawer of the MT connector 10 in the optical branching module 4, it was difficult to work without even optical (not shown) components connected to optical code 8w etc., such as said optical coupler 9, filter, etc., pulling out together, and affecting optical communication in the state of a live wire.

[0010] Since it was necessary to secure the work site for carrying out a connection change by the space and the MT connector 10 of each optical branching inter module for pulling out the optical branching module 4 mentioned above although there is a demand of improvement in the further packaging density with increase of the number of hold core wire if it is in said optical wiring rack, there was a limitation in improvement in packaging

density.

[0011] This invention was made in view of the above-mentioned technical problem, and it aims at offering the optical branching module which can mitigate the effect which it has on optical communication at the time of the activity of a connection change etc. as much as possible while being able to reduce workspaces for drawers in which an optical branching module is laid and being able to improve packaging density.

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## MEANS

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[Means for Solving the Problem] The body which contains the optical fiber with which the optical connector for multipoint connection was supported in the end section, and the optical coupler intervened on the way by the optical branching module of this invention inside, The connector for a change which connects optical fibers switchable, and its spare length for joint are contained. When it was prepared free [ frequent appearance ] in said optical connector for multipoint connection of a body, and the edge which counters and estranged from a body, the spare length for joint made it the solution means of said technical problem to have the movable extra length section pulled out as drawer extra length. As an operation of the optical branching module of this invention, the movable extra length section is pulled out to a body, and the change activity of the optical connector for a change, exchange of other optical components of movable extra length circles, and a maintenance are performed. Since there is no need of pulling out a body by carrying out like this, while being able to work without affecting the optical components within a body, and the optical components in the optical branching module by which proximal was carried out, re-receipt of the pulled-out optical connector for a change is also easy. Moreover, when the movable extra length section is pulled out to a body, the optical fiber pulled out from the movable extra length section functions as drawer extra length. [0013]

[Embodiment of the Invention] The gestalt of operation of the 1st of this invention is explained with reference to drawing 1 and drawing 2 below. The sign 20 in drawing is the optical branching module of the gestalt of this operation. The same sign is given to the same component as drawing 7 from said drawing 3 among drawing, and the explanation is simplified. The optical branching module 20 is contained by said frame 1 drawing 3 and given in drawing 4 .

[0014] Said optical branching module 20 is constituted possible [ support ]

through a support means 21 by the orientation in a frame 1, as shown in drawing 1 and drawing 2. The optical connector 23 for multipoint connection by the side of office equipment is installed in the end section 22 which attends frame 1 outside at the time of this support. The body 24 of the shape of sheet metal which contains the optical components of the optical coupler 28 which intervened in the middle of and tee 29 grade inside, [ two or more optical fiber tapes 25 (multi-core optical fiber) of four alignments connected to this optical connector 23 for multipoint connection, or eight alignments, and this optical fiber tape 25 ] The MT connector 26 as a connector for a change which connects the optical fiber tapes 8a and 8b (optical fiber) drawn from optical cable K and the optical fiber tape 25 switchable, and its spare-length-for-joint 25a are contained. In said optical connector 23 for multipoint connection of a body 24, and the edge which counters, it was prepared free [ frequent appearance ], and when it estranges from a body 24, it has the movable extra length section 27 which spare-length-for-joint 25a is pulled out, and functions as drawer extra length.

[0015] Said body 24 consists of lightweight materials, such as plastics, and is a closed-end rectangular pipe object of outside \*\*\*\*\*. The suspender 30 (21) is attached in the part of said connector 23 approach for multipoint connection of the 1 side-edge side of the direction of a shorter side of the rectangle of this body 24 as said support means 21. This suspender 30 positions a body 24 in the flat surface which predetermined turns to (perpendicular [ to a perpendicular and a dashboard 5 ] to a terminal assembly 2) by engaging with the engagement section which was prepared in the dashboard 5 of the upper case of the stage which arranges the optical branching module 20 in a frame 1 and which is not illustrated from an outside side ( drawing 1 left-hand side). In addition, the location of a suspender 30 is not restricted to what was illustrated. Moreover, as a support means 21, as long as positioning to said predetermined sense is possible in a body 24 except said suspender 30, you may be other configurations.

[0016] The edge face-plate 31 for supporting the connector 23 for multipoint connection is formed in the end section 22 of a body 24. Opening of the connector support hole 32 is carried out to the upper part (on drawing 1 ) of this edge face-plate 31. The connector 23 for multipoint connection is inserted in this connector support hole 32 considering the connection axis which makes optical connection of the plastic coated fibers as perpendicular to the edge face-plate 31.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the sectional side elevation showing the gestalt of operation of the optical branching module of this invention.

[Drawing 2] It is the perspective view showing the optical branching module of drawing 1.

[Drawing 3] It is the side elevation showing an optical wiring rack.

[Drawing 4] It is the front view showing an optical wiring rack.

[Drawing 5] It is the side elevation showing the conventional optical branching module.

[Drawing 6] It is drawing showing the conventional optical branching module, and is the side elevation showing the connection change by MT connector.

[Drawing 7] It is the schematic drawing showing the basic configuration of an optical branching module.

[Description of Notations]

1 [ -- An optical branching module 21 / -- A support means, 22 / -- An edge, 23 / -- The connector for multipoint connection, 24 / -- A body, 25 / -- An optical fiber tape, 25a / -- A spare length for joint, 26 / -- The connector for a change (MT connector), 27 / -- The movable extra length section, 28 / -- An optical coupler, 30 / -- A support means (suspender), K / -- Optical cable. ] -- A frame, 7 -- A plastic coated fiber (office plastic coated fiber), 8 -- An optical fiber tape, 20

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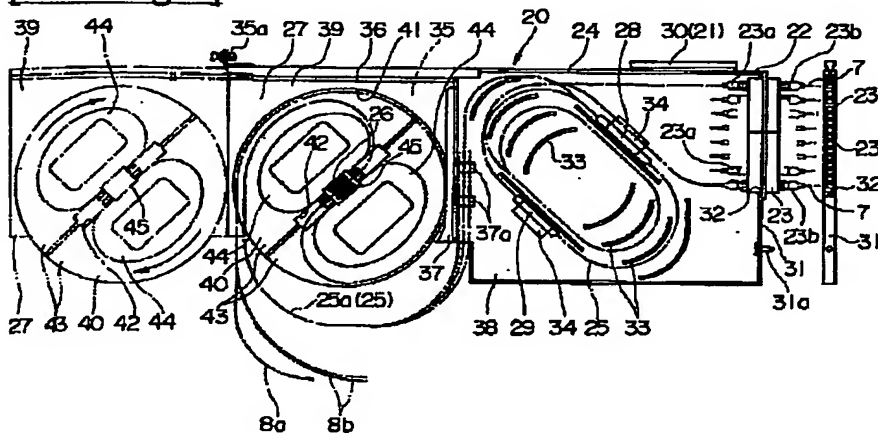
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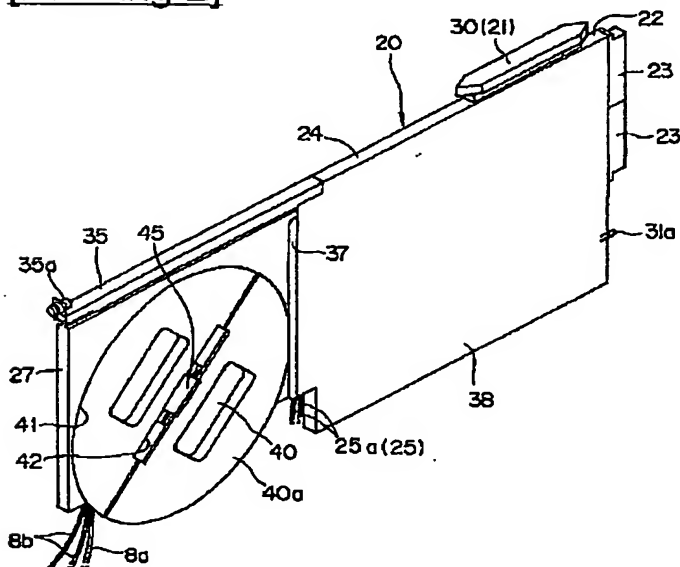
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## DRAWINGS

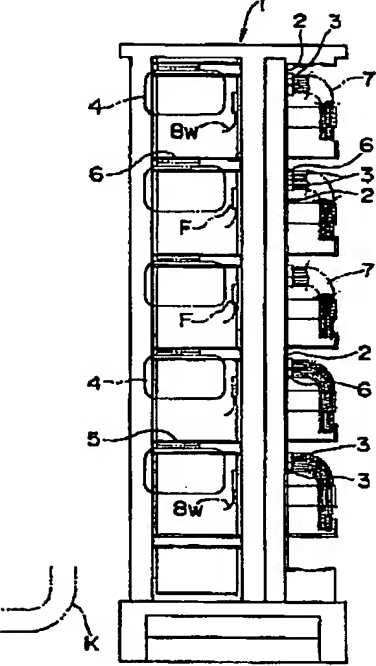
[Drawing 1]



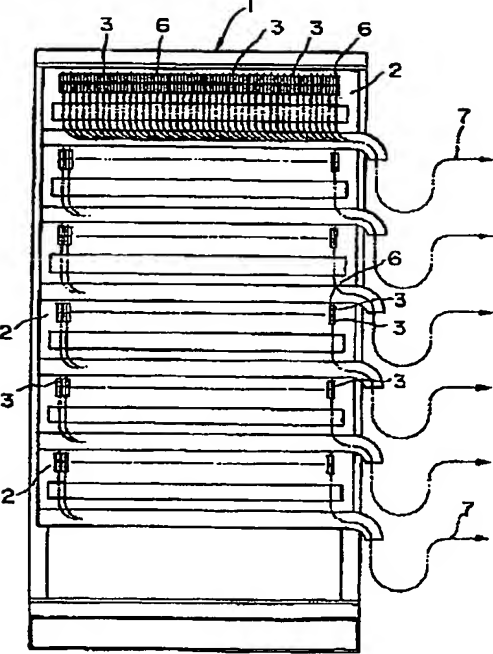
[Drawing 2]



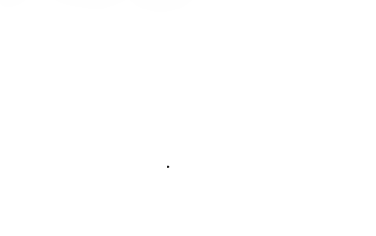
[Drawing 3]



[Drawing 4]



[Drawing 5]





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